BERMUDA

REPORT

OF THE

DEPARTMENT

OF

AGRICULTURE

FOR THE YEAR

1948

INSTITUTE OF COMMONWEALTH AGRICULTURE
23 SEP 1949

BOARD OF AGRICULTURE 1948.

Wor. H. St. George Butterfield, M.C.P. Chairman.

Messrs. C. Vail Zuill. Deputy Chairman.

Ford Baxter.

E. H. Barnes, M.C.P.

H. T. North, M.C.P.

L. R. Selley.

A. C. Benevides.

Abel Benevides.

The Hon. Sir Howard Trott, C.B.E.

DEPARTMENT OF AGRICULTURE 1948.

Civil Service List.

Director of Agriculture.	W. J. Kinghorn, M.A. (Edin.) B.Sc. (Edin.) (Up to and including 3rd. November 1948). W. R. Evans. (From 4th. November 1948).
First Agricultural Assistant.	W. R. Evans. (Up to 3rd. November 1948).
Inspector of Produce.	T. A. Hollis.
Horticulturist.	C. A. Baker.
Second Agricultural Assistant.	C. V. S. Early.
Clerk to the Board and Director.	Mrs. Thelma A. Smith. (Up to 31st. May 1948). Mrs. Marguerite J. Speed. (From 1st. June 1948).
Plant Pathologist.	E. C. G. Bedford, B.Sc. M. Sc. (Pretoria).
Government Veterinary Officer.	Dr. Edward R. Earl.

Not on Civil Service List.

Marketing Officer	J. H. Hollis.
Assistant Horticulturist	A. L. Rego.
Accountant	D. C. Eldridge.
Assistant Accountant	Miss Amy De Silva.
Clerical Assistance	Mrs. Helen Morrison.

Report of Director of Agriculture For the Year 1948.

The Chairman,
The Board of Agriculture.

I have the honour to submit herewith reports of the activities of the Department of Agriculture for the year 1948 in accordance with the provisions of the Agriculture Act, 1930.

It is regretted that in this report I will only be able to deal with projects and events in a general way as my term of office as Acting Head of the Department did not take place until 12th. August 1948.

AGRICULTURE IN 1948.

During the year under report farming in the Colony continued to shrink in proportions in spite of the strenuous efforts of the Board of Agriculture to stem the tide of recession which during the past few years has been a matter of grave concern to all agriculturally minded people. Agriculture is now at the lowest ebb in the history of the Colony and its rehabilitation, if it can be rehabilitated, will take a number of years and the road to recovery will be difficult.

An event of great importance during the year was the appointment of a Committee by the Board of Agriculture to enquire into the condition of the agricultural industry. This Committee, consisting of Mr. Ford Baxter (Chairman), Mr. E. H. Barnes, M.C.P., Mr. Abel Benevides and Sir Howard Trott, C.B.E., diligently investigated the problems of the industry during the summer months by interviewing people of every representative interest connected with production and marketing. The deliberations of the Committee culminated in the presentation of a comprehensive report which was forwarded to the Honourable House of Assembly on 10th August 1948. This excellent report, which diagnosed the ills of the agricultural industry and prescribed remedial measures of outstanding merit, received scant consideration from people who should have been interested in the welfare of the agricultural industry. It is hoped that this report will not be shelved and forgotten but that it will be utilized in full measure as a guide in redeeming Bermuda's agricultural industry which is the most valuable asset the Colony possesses.

Agricultural Station.

The condition of the buildings and grounds of the Agricultural Station leave much to be desired. The Agricultural Station should be a place of pride to the Department of Agriculture and a cause for admiration to our visitors, but I regret to say it is neither. The Government has provided money lavishly for work connected with agricultural matters for several years past, but very little of it has been devoted towards the creation of permanent assets at the Agricultural Station.

The building housing the Departmental staff is crude and most inadequate in every respect, and most of the outbuildings are of a make-shift nature and in bad condition. The grounds of the Agricultural Station are untidy because the activities of the Department, which were formerly of a botanical nature, have gradually been converted into a commercial phase, featuring enterprises which should be performed by private concerns. I hope that during my administration of the Department the features that tend to commercialize the work of the Department and which generally remove the beauty of the Agricultural Station grounds will be gradually eliminated. Thousands of pounds will be needed in order to transform the Agricultural Station into a desirable place, but it will be money well spent and the transformation should commence without delay.

Hurricane Damage.

The two hurricanes, one which occurred on 13th. September and the other on 7th. October, played havoc with plant growth throughout the Colony. Fortunately for the farmers their crop losses were small compared with their losses through similar circumstances in 1947 and their planting schedules were almost back to normal by the end of the year.

Trees and shrubs throughout the Colony suffered severe injury and many fine specimens of old trees were uprooted and lost. Banana plantations, which were beginning to bear fruit after the severe injury they received by the hurricane of October 1947, were again severely injured and thousands of unmatured bunches of fruit were lost.

Agricultural Exhibition.

The Seventeenth Agricultural Exhibition was held at the Agricultural Station on Wednesday and Thursday, 28th. and 29th. April. The attendance was the largest ever recorded, and the entries were more numerous than any of the Exhibitions held since the outbreak of World War II.

The Exhibition is a valuable asset to the Community; it develops a community spirit and it undoubtedly has a considerable educational value for young and old. The Department is under great obligation to the public spirited men and women who assist in staging the show which makes it the most important community effort and one that holds an unrivalled place in the life of the Colony.

Unfortunately, the Agricultural Station is very poorly equipped to stage these exhibitions and the Director and his staff are taxed beyond reasonable endurance to stage the hundreds of exhibits and cater to the entertainment of thousands of people with no permanent facilities at their disposal. There is a great need for permanent buildings for displaying the exhibits to the best advantage. The Agricultural Station has for too long been adorned with make-shift buildings which have detracted, rather than added to, the aesthetic beauty of the place. New buildings are necessary, but these must be edifices of beauty combined with utility, designed to make the Agricultural Station a place worth visiting, not only during the Exhibition, but at any time.

Dealing with exhibits benched in order of classification, the following brief comments are made. Considering that the Colony has become so highly motorized the exhibits of horses were both numerous and of good quality. Cattle were below former years, both in quality and quantity. Pigs were up to former years. Goats were in fair numbers, but the quality has deteriorated considerably during the war years. Importations are necessary to grade up existing stock. Poultry, which in pre-war days was invariably the top notch sections of the Exhibition, has fallen on evil days. Rabbits have dropped down several notches in recent years, and this was evidenced at the Exhibition. Vegetables were a fair quality but the entries were not so well filled as in previous years. Flowers were surprisingly good considering the unfavourable weather and the number of entries, at first disappointing, eventually filled in the entire benching facilities. Food products were, as usual, of good quality but the rationing of sugar had its effect on the number of entries.

Ring events of varied character took place on the two afternoons and were both instructive and entertaining. Thanks are due to Mr. C. Vail Zuill who officiated as Master of the Ring with marked ability, relieving the management of a great responsibility.

There was one "imported" judge in the person of Mr. Tom Hays of Toronto, Canada. Besides giving a fillup to the judging, Mr. Hays apparently knew the job from A to Z and his valuable pointers did not go unheeded either by the Cattlemen or Horse owners.

Winners of Special Prizes.

THE TROTT SHIELD.		Won by Paget Parish.
S.P.C.A.		" " Frith's Liquors Ltd.
HORSE LOVERS LEAGUE	1.	" " James Rochester.
	2.	" " Donald Dane.
CLAY MERRELL TROPHY.		" " W. C. Doe.
RAILWAY CHALLENGE CUP.		" " C. W. B. Ingham & Sons.
ROBERT WATSON MEMORIAL SHIELD.		" " Keith Hollis.
WATERSTON SHIELD.		" " Keith Hollis.

Parish Prizes.

ST. GEORGES.	Donated by Mr. S. S. Toddings, M.C.P. Won by Mr. E. P. T. Tucker, M.C.P.
HAMILTON.	Donated by Mr. P. C. Outerbridge, M.C.P. Won by Mr. I. W. Hughes.
SMITHS	Donated by Wor. B. C. C. Outerbridge, M.C.P. Won by Mr. Keith Hollis.
DEVONSHIRE.	Donated by Capt. the Hon. N. B. Dill, M.C.P. Won by Mr. and Mrs. Henry Vesey, Jnr.
PEMBROKE.	Donated by Mr. M. A. Gibbons. Won by Mr. Geo. North.

Parish Prizes—(Continued.)

PAGET.	Donated by Wor. H. St. George Butterfield, M.C.P. Won by Mr. B. W. Walker.
WARWICK.	Donated by Mr. W. S. Purvis. Won by Mrs. J. D. L. Gibson.
SOUTHAMPTON.	Donated by Mr. G. A. Williams, M.C.P. Won by Mr. Hamish Mitchell.
SANDYS.	Donated by Mr. W. E. Roberts, M.C.P. Won by Mr. W. R. Onions.

The Financial Statement is given in an Appendix.

Suffice to say that for the first time in the history of the Agricultural Exhibitions staged by the Department of Agriculture that the cost of operating the Exhibition was more than covered by the receipts.

PRODUCTION OF GROUND CROPS AND ANIMAL PRODUCTS AND LIVESTOCK POPULATION.

Below are given statistics of the estimated production of agricultural products:

A.

Commodity.	Area under crop expressed in acres.	Average yield per acre in lbs.	Total yield in lbs.	Unit value.	Farm value.
BEANS	45	4,000	180,000	1/-	£9,000
BEETS	30	12,000	360,000	4d.	6,000
BROCCOLI	15	3,000	45,000	1/3d.	2,800
CABBAGE	40	12,000	480,000	5d.	10,000
CARROTS	45	12,000	540,000	4d.	9,000
ONIONS	15	10,000	150,000	6d.	3,500
POTATOES Irish	275	8,000	2,200,000	4d.	37,500
POTATOES Sweet	20	8,000	160,000	3½d.	2,333
TOMATOES	30	10,000	300,000	8d.	10,000
MISC.	30	8,000	240,000	6d.	6,000
BANANAS	80	8,000	640,000	6d.	16,000
	625		5,295,000		£112,133

B. CITRUS:

Area under cultivation in acres.	No. of trees.	Average yield per tree in dozens.	Total yield in dozens.	Unit value.	Farm value.
50	7,000	3	21,000	4/-	£4,200

C. LILY BULBS AND FLOWERS:

Area under cultivation in acres.	No. of bulbs planted.	No. of bulbs exported.	Value.	No. of flower buds exported.	Value.
26	1,385,500	224,200	£9,000	18,000,000	£10,000

No. of flower stems exported.	Value.	Total value of all lily products.
16,000	£6,000	£25,000

D. MILK:

Total production expressed in gallons.	Value.
590,000	£122,500

E. MEAT PRODUCTS:

Beef expressed in lbs.	Value	Veal expressed in lbs.	Value	Pork expressed in lbs.	Value	Poultry expressed lbs.	Value
99,200	£7,400	43,700	£2,730	456,000	£28,500	58,500	£7,300

TOTAL VALUE.

£45,930.

F. EGGS:

Expressed in dozens.	Value
390,800.	£97,500.

LIVESTOCK POPULATION:

A. DAIRY ANIMALS.

Cows	**Heifers**	**Bulls**	**Total**
1,100	56	40	1,196

B. HORSES

Farm and Truck Horses	**Carriage Horses**	**Race Horses**	**Total**
250	200	50	500

C. PIGS:

Sows	**Boars**	**Store Pigs**	**Piglets**	**Total**
320	80	1,954	500	2,854

D. GOATS:

Adults	Kids	Total
300	200	500

E. POULTRY:

Adult Fowls	Chicks	Total
39,000	20,000	59,000

NOTE:

The following volume of vegetables were exported during the year:—

British West Indies: 3,250 bushels, mostly potatoes, having a farm value of £1,803. 10s.

Canada: 1,289 bushels, mostly carrots, having a farm value of £980. 10s.

FRUIT CULTURE.

Notwithstanding the effect of three hurricanes within a year citrus culture continued to grow in importance and popularity. 3,069 new citrus trees were imported and distributed by the Deparment during the year and the services of the citrus advisory officers of the Department were eagerly sought by a large number of growers.

The Bermuda Citrus Growers Association continued to function with efficient thoroughness and the much desired co-operation between the Department and the Association was fully maintained.

The Department undertook to service trees of members of the Association for a fee of three shillings per tree per annum. For this fee subscribers had their trees sprayed and fertilized three times during the year. Members of the association took advantage of the service and a total of 2,680 trees were serviced at a cost to the Government of £794 13s 9d. An amount of £435 5s 6d for service fees was reimbursed to the Treasury.

The Association held their annual meeting at the Agricultural Station on December 2nd. and a large number of members gathered for the occasion.

The Annual Citrus Fruit Exhibition was held on December 16th, 17th and 18th in the Marketing Centre in Hamilton, where a large display of excellent quality fruit was tastefully staged by Mr. C. A. Baker and Mr. August Rego of the Department, and officers and members of the Association.

Spurred by the knowledge obtained on Avocado Pear cultivation by Mr. J. M. Waterson during his visit to Florida in 1943, many residents have since become interested in growing the trees in their home gardens.

The Department imported 147 selected grafted trees during the year. These were distributed at cost price to about twenty householders in different parts of the Island, and from reports at hand the plants seem to be growing satisfactorily.

ASSISTANCE TO FARMERS.

A formidable number of mechanical units are maintained by the Department with the object of assisting farmers with their farm chores. While these facilities are eagerly utilized by farmers they are of doubtful value from an economical point of view and may well have a detrimental effect on the progress of farming in the Colony.

Successive Boards of Agriculture have pinned their faith on mechanising the Department of Agriculture to assist the farmers with their chores. I feel doubtful of the wisdom of this method because it encourages farmers to lean on the Department instead of developing successful techniques of their own. No farmer has ever prospered who has depended on the Department to spray his crops because the Department's spraying service, however perfect it may be, can spray but a small part of the farm crops in an emergency. To successfully combat diseases which are liable to attack farm crops at any time, the farmer himself must be equipped to cope with any emergency because blight infestation must be dealt with without delay. When a farmer depends on the Department's equipment to perform the work it is inevitable that there should be costly delays. The system so solidly implanted over a period of several years cannot be discarded abruptly without considerable dislocation, but I feel sure that a gradual abandonment of the practice would have a beneficial effect on the farming community within a few years.

The spraying units of the Department consist of the following:—

One 400 gallon	Sprayer mounted on truck.
One 300 "	Sprayer mounted on truck.
Two 300 "	Friend trailer sprayers.
One 100 "	" " "
One 50 "	Graveley tractor powered sprayer.
One 25 "	Dobbins motor sprayer.

The sprayers were operated for 981 working hours as follows:—

Ground crops.	630 hours.
Citrus Orchards.	243 "
Horticultural subjects.	90 "
Cedar trees.	18 "

The tractor units of the Department consist of the following:—

One Track Laying Tractor.
One John Deere Rubber tyre wheel Tractor.
One Graveley 5 h.p. Hand Guided Tractor.

During the course of the year the tractors ploughed and cultivated 600 acres of land.

The following motor vehicles are maintained for Departmental use:—

One 3-ton Dodge State body Truck.
One ¾ ton Dodge State body Truck.
One ¾ ton 4-wheel drive Jeep Truck.
One Willeys Army type Jeep.
One 10 h.p. Austin Van.
One 8 h.p. Morris Car.
One 8 h.p. Standard Car.
One Frances Barnette Powerbike.

The Department maintains an up-to-date workshop where vehicle maintenance and repairs are carried out under the direction of a trained mechanic.

GOVERNMENT HOUSE GROUNDS.

The grounds of Government House were maintained in fairly good condition under the supervision of Mr. C. V. S. Early, Second Agricultural Assistant. It has been a difficult matter to maintain sufficient gardeners to keep the grounds in good order and the staff was two men short during the last quarter of the year.

The grounds of Government House should be redesigned to make them more attractive and more dignified in keeping with the position of His Majesty's representative in the Colony.

During the war years much of the grassed land at Government House was brought under cultivation. Most of this land is shallow and not very desirable for vegetable gardening and its continued use for that purpose is not recommended.

CONTROL OF PLANT DISEASES AND PESTS.

The control of insect pests attacking the Bermuda Cedar, Juniperus Bermudiana, continued to be the main concern of the Department during the year. Th Commonwealth Bureau of Biological Control, under the direction of Dr. W. R. Thompson, who visited the Colony with other members of his staff on two occasions during the year, have handled the problem for the local Government with commendable efficiency.

After the hurricane of September and October the condition of the cedars became progressively worse, due to exposure of scale injured trees to severe winds and salt spray and the public became increasingly concerned with the worsening condition of the cedars. On the urgent request of the Chairman of the Board, Dr. Thompson, accompanied by Dr. Wendall F. Sellers, arrived in the Colony on 13th. December to survey the situation, which survey confirmed earlier reports of the Department on the condition of the trees. This visit of Dr. Thompson had the effect of paving the way to greater efforts to combat the pests, as on 15th. December he was invited to appear within the Bar of the Honourable House of Assembly to present his views first-hand to the Legislators. As a result of Dr. Thompson's personal contact with the Legislators, the way was cleared to greater efforts towards biological control by a promise of the provision of adequate

funds to build a new laboratory in the Colony and the extension of laboratory facilities in California which will permit mass breeding of predators and parasitic insects to combat the current troublesome pests and any new invasions which may well happen in the future.

Inspection methods directed to intercept the Japanese Beetle, *Popillia japonica*, Newm. were rigidly applied during the crucial months of June to September inclusive. A total of nine living beetles were intercepted at the American Naval Operating Base and Kindley Airforce Base.

It is gratifying to record that the Department received every possible co-operation from the officials of the American Naval Operating Base, the American Air Force and the local Department of Health in our efforts to control the entry into the Colony of dangerous pests.

The Colorado Potato Beetle, *Leptinotarsa deceninoata* Say. invaded the Colony on 5th. September in a shipment of table potatoes imported by Messrs. J. C. Cooper from Canada. The discovery was not made until the potatoes had been distributed to dealers, but a reward of twenty shillings and considerable publicity by the press and radio apparently set everyone looking for the pest, alive or dead. Altogether six live beetles and 25 dead specimens were recovered within a few days. Considering the thoroughness of the search spurred by the reward, and the fact that no evidence that the pest has become established has come to light since, it is reasonable to suppose that the invasion was nipped in the bud.

The Plant Pathologist, Mr. E. C. G. Bedford, has presented a detailed report of his pathological and entomological activities which are printed in full later in this report.

HEALTH OF ANIMALS.

Since the creation of the office of whole-time Government Veterinary Officer there has been a marked decline in the incidence of Tuberculosis in cattle. During the year under review only one was discovered, a record of which the Colony may well be proud.

Hog Cholera, which a few years ago was very prevalent during the summer months, is now negligible, which indicates the wisdom of regularly inoculating the hog population with anti-hog cholera serum.

Complete details on health of animals and other relevant subjects will be found in the report of the Government Veterinary Officer.

REFORESTATION.

On assuming office as Director of Agriculture I took energetic steps to organize a constructive programme of land clearing and reforestation. It is estimated that forty per cent of Bermuda's native cedar trees have died from injury inflicted by scale insects during the last four years, and very little has been done to repair the damage. I presented a report to the Reforestation Committee of the Board, which was submitted and approved by the Board of Agriculture on 17th. November 1948. This report

and a further supplementary report dealing with the situation in more detail was presented to the Honourable House of Assembly on 2nd. December 1949.

The report was favourably received by both branches of the Legislature and the subject from hereon assumed great importance in public interest. While the final Legislative sanction of the scheme, which involves an expenditure of £30,000 during 1949, had not materialised at the end of the year, the plans envisioned in the report were being energetically prepared to be put into effect with the least possible delay in 1949.

Marketing of Produce.

The Government Marketing Centre serves the farmers in a dual capacity; farmers who market their crops wholesale find the Marketing Centre a helpful and time-saving medium to dispose of their produce, and those who market their produce retail may take advantage of the cold storage facilities which are provided to them at reasonable rates. The volume of business transacted through the Marketing Centre during the year was 8 per cent higher than the previous year.

The Marketing Officer was only able to maintain a satisfactory standard of business by much inconvenience to himself due to frequent labour difficulties.

The following volume of business was transacted during the year:—

Month.	Purchases.	Sales.	Cold Storage.
January	£ 376 9 4	£ 352 19 9	£ 25 5 9
February	732 18 10	477 15 5	25 12 8
March	730 19 11	763 18 3	64 13 6
April	1,354 10 5	1,284 7 4	62 19 3
May	2,600 8 9	1,748 10 2	53 8 6
June	2,778 14 8	2,831 3 5	80 18 0
July	1,058 17 1	2,290 17 10	124 12 9
August	340 19 6	812 0 6	85 2 0
September	116 6 9	253 14 8	187 15 3
October	202 3 1	223 4 2	56 1 6
November	332 17 6	315 4 2	22 3 9
December	271 2 3	291 7 5	130 18 3
	£10,896 1 1	£11,646 3 1	£919 11 2

Report of the Plant Pathologist 1948.

I have the honour to submit a report on work done on plant diseases and pests during the year 1948.

GENERAL REVIEW.

The Colony was without a Plant Pathologist from the 26th. May 1947 to the 10th. May 1948. Dr. W. R. Thompson and Dr. G. C. Ullyett (Director and Senior Entomologist respectively of the Commonwealth Bureau of Biological Control) visited Bermuda during this interval in connection with the biological control of pests of the Bermuda cedar tree. The writer commenced duties on the 10th. May 1948.

Work done during the year was confined mainly to the biological control of the Juniper scale, *Diaspis visci*, on the Bermuda cedar tree, *Juniperus bermudiana* L. Surveys indicate that every tree on the islands is now infested with the scale, which is still increasing and defoliating and killing trees, especially in the eastern and western parishes. The introduced predator, *Lindorus lophanthae* (Blaisd.), is now present throughout the Islands and is beginning to check the scale. Parasites were liberated for the biological control of the potato tuber moth, *Gnorimoschaema operculella* Zell.

Two severe hurricanes were experienced during the year. The salt spray caused severe defoliation of cedar trees over a very extensive area, while hundreds of the trees were blown down. Most of the other vegetation suffered a temporary setback. There was a severe loss of citrus fruit and banana plants.

MAJOR PROBLEMS INVESTIGATED.

Biological Control of Diaspis visci on Cedars.

1. *Review to Date: Diaspis visci*, the Juniper or White Scale, was most probably introduced at "Chelston", Paget, on coniferous nursery stock imported from California on December 12th, 1942. The scale was not discovered until August 1945 when it was found by Mr. W. R. Evans at "Chelston". By the end of 1945 a few of the infested trees had been killed and others had been badly defoliated. The trees within an area of about three acres were noticeably affected, the foliage presenting a brown appearance. (See Report of Plant Pathologist, Bermuda, 1946).

By the end of 1946 the affected area was approximately 2½ miles long and ½ a mile broad, the scale still being confined mostly to Paget Parish.

By the middle of 1947 the scale could be found from Belmont Manor in Warwick to the Harrington Sound area, but by the end of the year, *Diaspis* had spread westwards as far as Warwick Camp, and eastwards to the old fort beyond St. George's and to Castle Point.

In March 1948 Dr. W. R. Thompson found that the scale was distributed over practically the entire Island. Surveys made by the writer at the end of 1948 indicate that every tree throughout the Bermuda Islands is infested with *Diaspis visci.* The degree of infestation ranges from trees with only a few scales difficult to detect, to trees with nearly all the foliage heavily infested with scale.

Defoliation of branches of trees due to heavy infestations of *Diaspis* has occurred in every Parish in Bermuda during 1948. Hundreds of trees scattered singly or in groups throughout the Islands were defoliated completely and killed by the scale.

The intensity of the breed-up of the scale appeared to be subsiding in parts of Paget, Pembroke and Devonshire Parishes during 1948. The scale on many of the trees appears to be checked by parasites and *Lindorus* working together, but heavy infestations of scale still persist in this area.

In the more recently infested eastern and western portions of the Islands the scale increased rapidly during 1948 and the present position is worse than in the central parishes. The best remaining wooded areas are now in St. George's and St. David's Islands and in Southampton and Sandy's Parishes, but although large groups of trees are only very lightly infested, the general scale population is still increasing and many trees are heavily infested. Trees will continue to defoliate and die in 1949. There are good indications, however, that the ppulation of *Lindorus* on the Islands will reach its peak during the next summer and autumn with the possibility that *Diaspis visci* might be at least partially controlled.

The number of Bermuda Cedar trees already killed by *Diaspis visci* at the end of 1948 runs into many thousands. Paget Parish, in which the scale first became established, has suffered the worst, the greater percentage of the trees now being dead.

The main parasite attacking *Diaspis visci* is the Chalcid, *Aspidiotiphagus lounsburyi* Berlese and Paoli, which was probably introduced together with the scale. Despite a high percentage of parasitism, however, the parasites are not able to control the scale by themselves.

2. *Introduction of Predators in 1948:* Work on the biological control of *Diaspis visci* was undertaken in January 1947, by the Commonwealth Bureau of Biological Control under the direction of Dr. W. R. Thompson, who visited Bermuda personally. Several species of Coccinellids and one parasite were introduced. A summary of the work done will be found in: "Reports of the Parasite Service, 1945—46 and 1946—47, printed in 1948 as a supplement to the Annual Report of the Commonwealth Agricultural Bureaux.

The Bureau sent predators to Bermuda from California and from France during 1948, for liberation against *Diaspis.* The species and num-

bers of predators liberated in the field from April 12th. to December 31st. 1948 is as follows:

Species.	*No. liberated.*
1. *Lindorus lophanthae* Blaisd.	5,391
2. *Chilocorus bipustulatus*	1,905
3. *Zagloba ornata* Horn.	601
4. *Cybocephalus* sp.	1,149
5. *Cephaloscymnus occidentalis.*	45
Total predators liberated:	9,091

All species are Coccinellids except *Cybocephalus* which is a Nitidulid.

A small number of beetles, not included in the above figures, were kept in the laboratory for rearing on *Diapsis visci.*

Lindorus was already well established in 1947 and will be discussed below.

Chilocorus bipustulatus was not established, although it was reared to the adult stage on *Diaspis.* Liberated adults remained feeding on the scale for several weeks in the field.

Zagloba and *Cephaloscymnus* are predators of *Diaspis visci* on cedars in California. Both were reared in the laboratory on *Diaspis* and are very promising predators. *Zagloba* has not yet been established. Only 45 *Cephaloscymnus* have been liberated, but one larva was recovered in the field.

Only one larva of *Cybocephalus* has been found in the field after liberations of adults were made. This Nitidulid was easily reared on *Diaspis* in the laboratory.

3. *Lindorus lophanthae:* This Coccinellid was first introduced early in 1947 and liberations were continued until November 1948. It became established very quickly and its subsequent increase and spread throughout Bermuda have indeed been remarkable. *Diaspis* had, however, a five years' start on the predator, so that the task of controlling the scale and saving the cedars is a formidable one.

Both adults and larvae of all sizes were found feeding on *Diaspis visci* on cedar trees during every month from May to December 1948. Field inspections made during the summer of 1948 showed that the predator was distributed throughout the chain of islands from Ireland Island in the west to St. George's and St. David's Islands in the east, but the distribution was not uniform. *Lindorus* could not be found in several places on groups of trees which were heavily infested with scale, although it was present in nearby stands of trees. The *Lindorus* bettles received from California in 1948 were liberated mainly in sites where the predator was absent or scarce.

By the end of 1948, *Lindorus* was remarkably well distributed throughout the Islands, adults and larvae of all sizes being easily found on practically every scale-infested tree, in every group of trees. It was still occasionally absent, however, on individual branches which were heavily infested with scale, so that its distribution is still uneven and not yet complete. The scale on such branches is extremely healthy and increases rapidly despite the high percentage of parasitism.

Trees at "Wreck House", Sandy's Parish, afford an example of uneven distribution of *Lindorus*. Foliage from trees at the entrance to the estate was collected on the 8th. September and examined under the microscope. A count of the different percentages of the live stages of the scale was not possible because nearly all scales along the entire length of all the branchlets, except those scales with parasite emergence holes, had been eaten by predators. *Lindorus* was obviously responsible as it had been found on these trees a few weeks previously. A few hundred yards away, in the centre of the property,no *Lindorus* were found, so some were liberated on the 14th. August. On the 8th. September the scale was very healthy, although a high percentage was parasitized, and there was no sign of feeding by *Lindorus*. A survey was made here on the 28th. December. *Lindorus* was easily found throughout the group of trees, although it was not found on a few heavily infested branches. As many as forty larvae were found on a single branch. The scale infestation is, however, still a long way ahead of the predator on heavily infested trees, some of which have had branches filled during the last six months.

The scale position at "Wreck House" is typical of the eastern and western ends of the Island where many of the trees are still very healthy, although the scale is increasing in these areas.

Lindorus will probably reach its peak populations in the eastern and western parishes during the next summer and autumn, after which it is reasonable to hope that the scale infestation will decrease as seems to be the case already in parts of the central parishes.

Lindorus adults and larvae can now be found on foliage which at first sight appears to be free of scale but which has a relatively light infestation, so that they appear to be breeding where the host density is fairly low.

As we cannot be certain yet of final and permanent success with *Lindorus* alone, and as time is now a very vital factor, attempts are being made to establish other species of predators.

LEPIDOSAPHES NEWSTEADI ON CEDARS.

The Oyster-shell scale, *Lepidosaphes newsteadi* Sulc., was probably introduced prior to 1942 on coniferous nursery stock brought to the area around Castle Harbour Hotel, Tucker's Town. It was first discovered by Mr. T. A. Russell at Harrington Sound in December 1944. By the end of 1945 it had spread through the region around Castle Harbour Hotel, Tucker's Town, Paynter's Vale and Walsingham and also to Frascati Golf Course at the Flatts. Some trees had already been killed by the scale.

The oyster-shell scale continued to spread and to kill trees during 1946. It extended around Harrington Sound and to St. George's and St. David's Islands, while an isolated outbreak was found in Pembroke.

During 1947, however, the spread of the scale and the amount of damage done was not much more extensive than in 1946. The intensity of the *Lepidosaphes* infestation decreased further in 1948, little damage occurred and the area of distribution remained practically the same. It was actually very difficult to find oyster-shell scales during the latter half of 1948. No heavily infested trees were found and no further damage was observed. The reason for the present scarcity of this pest has not yet been established.

EFFECTS OF THE 1948 HURRICANES.

1. *Effects of the hurricanes on cedar trees.* Mention must be made of the two severe hurricanes which were experienced in September and October 1948. Unusually extensive damage was caused to the foliage of the local cedar, *Juniperus bermudiana* L., thousands of trees being largely defoliated as a result of a heavy drenching of undiluted salt spray.

The first hurricane was experienced on the 13th. September. There were average winds of between 80 and 100 miles an hour with gusts in the neighbourhood of 130 miles an hour. Winds of hurricane force, accompanied by rain and salt spray, lasted for six hours. The wind veered round from the East to the South West during the course of the day.

The September hurricane had a very drastic effect on the foliage of most plants throughout the Island except where it was well protected. The leaves of most trees, shrubs, hedges, flowers and weeds were burnt by salt spray and the plants soon presented a blackened appearance, similar to the results of a severe frost. Most citrus trees were severely defoliated and the tips of the branches were killed. Even seashore palnts such as the Seaside Grape. *Coccolobis uvifera,* accustomed to a mist of salt spray, had foliage and branches killed by the spray. Grass near the shore was also burnt. Most plants put out new growth within a few weeks and were soon green again.

The Bermuda Cedar tree suffered very severely from the September hurricane, although it is less affected by salt spray than most other plants. The burning of cedar foliage by hurricanes has been noticed before by Bermudians. Dr. W. A. Macky, the Meteorologist, states that cedar trees were affected by salt spray during the hurricanes of October 1939 and October 1947.

The injury immediately following the first hurricane of September 13th. 1948 showed up as a reddening and drying up of the cedar foliage.

Very little damage to cedar foliage occurred in Sandy's Parish. Southampton suffered damage which was confined mainly to trees along the cliffs on the South Shore. Severe and extensive damage extended from Warwick to St. David's Island. The worst damage was naturally on the slopes of the hills facing the South Shore, which received the full

force of the storm, but most of the Island not being more than a mile wide, the salt spray damage extended inland to slopes facing the South, including those on inland bays and harbours.

While hurricanes occur periodically in Bermuda (five were experienced from 1926 to 1948) the amount of salt spray blown on to the trees, unaccompanied by rain, was undoubtedly exceptional. The dosage of salt spray was above the critical amount which healthy cedar foliage can stand. Healthy cedar foliage on which only a few or no scales could be seen was severely burnt, so that the extensive damage cannot be ascribed to the presence of the juniper scale on the trees, except that the spray would penetrate trees with sparse foliage more easily than trees with dense healthy foliage.

The unusually extensive damage caused by this hurricane to the cedar foliage can probably be explained by the fact that all the rain came in the earlier part of the storm, while hurricane winds laden with salt spray continued to blow for 2½ to 3 hours after the rain had ceased, so that the trees were drenched with undiluted salt spray. The rain stopped at 3.30 p.m. and no more was recorded until 3.45 a.m. when only 0.08 inches fell. There was only a trace of rain on the day and night following the hurricane.

The second hurricane, which occurred on the 7th. October, was also severe but of short duration. The hurricane winds and the rain came together so that the salt spray was diluted. Trees near to the North Shore were burnt by salt spray, but the damage was not extensive. This hurricane, however, stripped the trees of most of the dead foliage resulting from the September hurricane, the roads in places being completely covered with a carpet of cedar brush. The very extensive damage caused by the September hurricane was now suddenly revealed, as thousands of trees were wholly or partly defoliated. This sudden deterioration of the cedar trees, added to the damage already caused by the juniper scale, the oyster-shell scale and the spruce mite, resulted in considerable concern among the public and in the House of Assembly, the tendency being to blame the scale for this deterioration. Many of the trees which were largely stripped by the hurricanes have slowly started to put out new growth. The smaller branches and the tops of numerous trees have, however, been killed. The effects of the hurricanes were, indeed, catastrophic. It remains to be seen to what extent the trees can recover.

It can be conservatively estimated that one third of the cedar trees in Bermuda are dead or as good as dead due to the ravages of the two scales, one third are partly or largely defoliated due to hurricane and scale damage, and one third have foliage over the whole tree but only about half of these again have the typical dense foliage of a healthy Bermuda cedar tree.

Statements given to the local press on the 16th. December 1948 by Dr. W. R. Thompson, who inspected the hurricane damage, substantiate the writer's conclusions. Dr. Thompson reported as follows:—"There is no doubt that there has been a considerable further deterioration in the condition of the cedars since last summer. This, however, is not in my opinion entirely due to the increase in the scale, but is partly due in certain quite extensive areas to the series of hurricanes and the salt spray."

2. Effects of the Hurricanes on Cedar Insects:

(a) *Diaspis scale on cedars:* The two hurricanes did not improve the general scale position. The scales appeared to be just as healthy after the hurricanes as before them, even on the South Shore, except where the cedar foliage was killed by the salt spray. Numerous adult parasites of the scale were undoubtedly destroyed, however, as well as many *Lindorus* larvae and adults, which would actually be in favour of an increase in the breed-up of the scale.

When the scale was examined on the 14th, the first day after the September hurricane, the cedar leaves were still moist due to the salt spray and the scales were very inconspicuous and more semi-transparent than usual. Nearly an inch of rain fell on the 15th. and 16th. and the scale regained its conspicuous whitish colour.

Diaspis was examined at several exposed sites from three to eight days after the hurricane. Scale from trees at Elbow Beach Surf Club and from Sandy's Parish had been examined on the 4th. and 8th. September, prior to the hurricane, by peeling off the cedar leaves and lifting up the scale covering in order to inspect the insect below. Scale from the same trees was examined after the hurricane. There was no apparent increase in the proportion of dead scales, and the same proportion of the different stages of live scales was found before and after the hurricane. Live scales in all the different stages were found after the hurricane, including eggs and crawlers. They were found on the trees facing the hurricane and on the sheltered side. Healthy larvae and pupae of parasites were also found inside parasitized scales, and parasites emerged from foliage collected after the hurricane.

(b) *Black Scale on Cedars:* Many active crawlers were found among black scales (*Acutaspis perseae* Comstock) at the foot of Wreck Hill, Sandy's Parish, a week after the September hurricane. Live scales in different stages were present. Strong winds were experienced at this site but there was little damage by salt spray.

(c) *Lindorus lophanthae:* A search for *Lindorus* was made on St. David's Island ten days after the hurricane. (The predator was easily found in this area in July). Four adults and twenty-eight larvae were found on the trees. Another search was made on the same trees on the first day after the October hurricane. One adult and nineteen larvae of all sizes were found. These larvae therefore managed to remain in the trees during the severe hurricane, although many were probably blown off the trees. The site was not sheltered as several trees were blown down.

It is not possible to make even a rough estimate of the percentage of adults and larvae of *Lindorus* which were undoubedly destroyed by the hurricanes. There remained, however, a good residue of *Lindorus* actively breeding in the field. Judging by the abundance of *Lindorus* and the ease with which it could be found on practically every scale infested tree anywhere on the Islands during December, it is obvious that the hurricane did not have a catastrophic effect on the predator of Diaspis, except where the trees were practically stripped of their foliage. Both scales and ladybird larvae naturally perished on branches which defoliated completely after the foliage was burnt by salt spray. *Lindorus* is still present on the few remaining healthy branches in areas of practically defoliated trees along the South Shore which suffered the greatest hurricane damage.

BIOLOGICAL CONTROL OF THE POTATO TUBER MOTH.

Further introductions of parasites for controlling the potato tuber moth, *Gnorimoschaema operculella* Zell. were made in 1948. The pest was very difficult to find in most of the potato plantings during May and June. This was unfortunate as it made it more difficult for the parasites to become established. The potatoes in most fields were lifted before the end of June, when larvae of the potato tuber moth could be found in all fields where potatoes were left lying on the ground, the infestation being quite heavy in a few cases.

A total of 105 boxes, containing parasitized larvae of the potato tuber moth, were sent by air from Riverside, California, by Mr. Wendell F. Sellers, Senior Entomologist, Commonwealth Bureau of Biological Control. They were shipped without any food and arrived in excellent condition, the parasites emerging after arrival. The total consignment was estimated to yield 397,377 parasites of four species, which were liberated in the field from the 5th. May to the 5th. July 1948. The boxes containing the parasites were placed on stakes in the field as soon as they started to emerge, except in the case of *Omorgus phthorimaeae* which was kept in the laboratory and allowed to mate before being liberated.

The four species of parasites and the estimated numbers which were liberated are as follows:

Species.	*Number liberated.*
1. *Chelonus phthorimaeae* Gah.	26,050
2. *Copidosoma Koehleri* Blanchard.	312,620
3. *Microbracon gelechiae* (Ashm).	55,800
4. *Omorgus phthorimaeae.*	2,907
	397,377

The parasites were liberated in 32 potato fields and in 5 tomato fields, distributed on 27 farms in six parishes.

A total of 21 samples of potatoes infested with larvae of the tuber moth was collected from 16 potato fields during June and July. The later samples were from fields in which potatoes were still lying about after the crop had been lifted. Parasites were recovered from 14 samples from 11 fields. These were sent away for identification.

MINOR INVESTIGATIONS.

Weed Killer for Onions.

"Aero Cyanate", a new weedkiller for destroying weeds in onions, was tested out. Good results were obtained in the onions seedbeds. The onions were planted out in December and spraying trials are being continued.

Notes on Citrus.

In the writer's opinion the shape of nearly all the citrus trees on the Island is disappointing. Most of them are much too bushy with little or no main trunk; numerous main branches emerge close to or even below the ground. New plantings should be regularly inspected and pruned (especially to remove suckers on the main trunk) in order to produce the required shape of a citrus tree. Stunting of the trees, especially when young, by hurricanes tends to increase the bushy shape which, it is locally maintained, is better adapted to withstand strong winds.

Although some leaves showed signs of nutrient deficiencies, the citrus trees in general have a good colour and growth.

INSPECTION SERVICES.

Inspection of Plant Importations: The Plant Pathologist inspected and passed about 50 consignments of ornamental plants, bulbs, etc..

The following consignments imported contrary to Bermuda Bye-Laws were intercepted and destroyed: Narcissus and Daffodil bulbs (5), plants in soil (3), banana plants and fruit, sweet potatoes, corn and carrots, Several parcels of "tea leaves" were confiscated.

Insects intercepted: Three pupae of wasps and a few colonies of an ant were found in soil from the West Indies. Five species of insects and three species of mites were found in ginger roots from the West Indies.

Bird eye peas from the West Indies and a sample which was purchased locally were infested by a bean weevil (probably the four-spotted bean weevil, *Bruchus quadrimaculatus,* Fab).

One live caterpillar was found in "tea leaves" (a mixture of leaves from various shrubs) which came from the West Indies.

Japanese Beetle, Popillia Japonic, Newm.: The usual precautions were taken to prevent the dreaded Japanese Beetle from becoming established on the Island. Japanese Beetle traps were set up on lawns at the Hamilton Docks. and in its vicinity on the 1st. June and were removed after the end of September. Traps were also placed at the docks of the American Naval Operating Base, at St. George's docks and at Kindley Airfield. No Japanese Beetles were captured in these traps.

A seaplane which arrived at the N.O.B. from Norfolk, Virginia on the 22nd. June, was inspected. Many dead beetles and four living beetles were found in the plane. One living beetle was intercepted on a plane at Kindley Field.

A cargo ship arrived at the N.O.B. on the 28th. June from Norfolk, Virginia. At least thirty dead Japanese Beetles were found on all the decks of the boat and in the refrigeration hold. Three live beetles were found on boxes of vegetables after they were removed from the ship and one live and one dead beetle were found inside cabbages which were removed from crates for inspection.

About 100 dead Japanese Beetles were found in scratch feed, which was imported from the U.S.A.

The total number of living Japanese Beetles intercepted during the 1948 season was nine.

Colorado Potato Bettle, *Leptinotarsa desemlineata* Say.: The presence of Colorado Potato Beetles in a shipment of potatoes from Canada was detected after the potatoes had been distributed. A reward was offered for all live or dead Colorado Beetles found in these potatoes in order to reduce the chances of the pest becoming established in Bermuda A total of six live beetles and 25 dead beetles were recovered from the shipment.

NOTES ON PESTS AND DISEASES.

Arranged according to hosts.

ALLIUM CEPA L., Onion:

A medium infestation of the larvae of the seed-corn maggot, *Phorbia fusciceps* Zett., was found mining the leaves of seedling onions during November. Some adult flies and a few parasites were reared.

CITRUS PARADISI Macf., Grapefruit.

Considerable loss of fruit was caused by *Ceratitus captata Wied.*, the Mediterranean fruit fly, in one orchard of grapefruit trees during August, the fruit being "stung" all over so that it coloured up prematurely and fell off the tree.

CITRUS sp.

Eriophyes oleivorus Ashmead, the rust mite, caused considerable blemishing of citrus fruit.

Icerya purchasi Mask., Cottony-cushion scale. Some groves were very heavily infested with this pest which was eventually controlled by *Rodolia cardinalis* Muls.

Cocus hesperidum L., soft brownscale, was found in many citrus groves, and in some cases the leaves were black with sooty mould. Although it was first recorded in 1901 and has been found on several hosts, it has only been found on citrus in recent years. The scale on citrus was attended by numerous ants (probably *Pheidole megacephala*).

A few young citrus trees were seen with the leaves completely devoured by the fire-worm, *Xylomiges eridania* Cram.

Purple scale, *Lepidosaphes beckii* Newm, was satisfactorily controlled by means of oil spraying.

MUSA CAVENDISHII Lamb., Banana:

Helminthosporium torulosum (Syd.) Ashby, "Black Tip" disease, was very severe and a large proportion of the bunches were affected in several plantations during August. The severity of the disease was probably due to the unusually heavy summer rains.

NERIUM OLEANDER L., Oleander:

Aulacaspis pentagona Targ., Oleander scale: Most of the Oleander shrubs and hedges in Bermuda are still free of this scale which was very successfully brought under biological control by introducing parasites from 1921 to 1924. The base of a few branches is sometimes still found to be infested with the scale, and in few rare cases the infestation spreads over a whole shrub or portion of a hedge and kills most of the branches.

During July some Oleander bushes which were heavily infested by the oleander scale were inspected at "Cambridge Beaches", Somerset. The scale had defoliated and killed branches on the infested plants. Most of the Oleander hedges on the property were, however free of the scale.

The scale was examined and relatively few emergence holes of parasites were found. The scale was not being controlled by its parasite *Aphelinus diaspidis*. The mite *Pediculoides ventricosus* Newp., (subject to final identification) was found on practically all of the pupae of the parasite of the oleander scale and was obviously predaceous on the pupae. On each shrunken pupa there were usually two engorged female mites, and crawling over them in most cases were a few mites without distended abdomens. This mite is known to attack the parasites of scale insects. It did not appear to attack the oleander scale itself.

VITIS VINIFERA L., the Grape:

Phylloxera vitifoliae Fitch., Grape Phyllovera. Some grape vine leaves were heavily infested by the *Phylloxera* aphid.

ZEA MAYS, Corn:

The fulgorid leaf-hopper, *Peregrimus maidis* Ashm. was common on corn in the Station grounds during November.

OFFICE WORK.

Office work consisted of attending to correspondence, including letters to many persons who introduced plants without first obtaining the necessary permit. Working without a laboratory technician or a field assistant has not allowed much time for actual research work.

ADVISORY WORK.

About fifty visits were made in order to attend to requests to inspect cedar trees and to give advice on the control of diseases and pests.

FIELD SURVEYS.

A great deal of time had to be spent in the field surveying for the Juniper scale and its predator, *Lindorus,* searching for the Oyster-shell scale, inspecting hurricane damage to cedars, and locating suitable potato fields for the liberation of parasites of the potato tuber moth.

ACKNOWLEDGMENTS.

Thanks are due to the Commonwealth Bureau of Biological Control for the excellent condition of shipments of predators for the Juniper scale and of parasites for the potato tuber moth.

Dr. W. A. Macky, the Meteorologist, kindly supplied meteorological data on hurricanes.

VISITORS

A general survey of the cedar trees was made with Dr. W. R. Thompson (Director, Commonwealth Bureau of Biological Control, Ottawa, Canada) and Mr. Wendell F. Sellers (Senior Entomologist, Commonwealth Bureau of Biological Control, Riverside, California, U. S. A.), who visited the Island at the request of the Bermuda Government.

Dr. George H. Plump (Entomologist for the Department of Agriculture, Connecticut, U. S. A.) visited the Island to inspect Mr. A. B. Dick's cedar trees. The general condition of the cedar trees in several parishes was inspected with Dr. Plumb.

Respectfully submitted,

E. C. G. BEDFORD,
Plant Pathologist.

Report of Government Veterinary Officer for 1948.

I have the honour to submit my report for 1948.

In order that this report may be as clear as possible, each phase of my work as Government Veterinary Officer will be dealt with under its appropriate heading and as concisely as possible.

TUBERCULOSIS CONTROL.

Tuberculosis in cattle is controlled by means of bi-annual testing of all cattle in these Islands; the slaughter under inspection of those animals which react, with the payment of compensation to the owners of the condemned animals and the quarantine of premises where reactors are found until three clear tests of sixty to ninety day intervals have been passed.

During the first six months of 1948, 1,171 head of cattle were submitted to the tuberculin test with no reactors being found.

During the last six months of 1948, 1,196 head of cattle were submitted to the tuberculin test with one reactor being discovered.

Thus far in a total of 2,367 tests in 1948 only one reactor was found giving the per cent of reactors for the Island for the year of .05 per cent, which is extremely good and holds promise of a bright future in T.B. Control in cattle in these Islands.

The reactor was a heifer that had been raised for part of its life on a property that a few years ago housed a whole herd of tuberculus cattle.

BRUCELLOSIS (BANG'S DISEASE) CONTROL.

The policy followed in this instance is that of calfhood vaccination, that is, all calves that are to be raised are vaccinated with strain 19 Brucella abortus vaccine between the ages of four to eight months and are bled between sixty to ninety days after vaccination to determine whether or not the vaccination has been successful. If not successful, the calf is revaccinated and bled in a further sixty to ninety days.

In addition any private owner of a cow may, on request, when the animal is being tested for tuberculosis, have its blood tested in order to determine wehther or not it is positive and might possibly transmit Undulant Fever in its milk.

During the first six months of 1948, only seventy-eight calves were vaccinated and due to the unfortunate fact that a shipment of Strain 19 vaccine was lost just prior to the start of the second testing period, I was unable to vaccinate any during the second six months, but as the vaccine

has now arrived, I will do those to be done at once. Above sixty are to be done which shows a marked decrease in the number of heifers being raised here.

Only three private owners requested that a blood test of their cattle be made during the year.

HOG CHOLERA CONTROL.

This control consists of the annual inoculation of all hogs in the Island with anti-hog cholera serum during the spring months and other inoculations with the same material when an outbreak occurs or is suspected of occurring.

Two thousand eight hundred and fifty-four hogs were inoculated during 1948. As far as is known only one death was due to Cholera in 1948.

Apparently this method of control is proving quite effective in Bermuda.

MEAT INSPECTION.

This phase of my activity comes under the direction of the Department of Public Health. The information gathered during the routine inspection of all carcasses coming into the abbatoirs for slaughter gives a very excellent idea of the efficiency of the various tests and control methods used to combat animal disease.

During 1948 an additional slaughter house was licensed. This one is in St. George's.

The various classes of livestock slaughtered and the amount month by month is listed below:—

Month	Cows	Bulls	Steers	Calves	Hogs	Sows	Boars	Goats
January	25	—	—	39	129	44	—	—
February	20	5	—	44	136	48	—	—
March	19	1	—	36	153	52	—	—
April	18	2	—	30	145	33	—	—
May	20	1	—	35	130	40	—	1
June	23	—	—	36	155	37	—	1
July	17	1	—	31	122	17	—	—
August	19	1	—	44	113	21	—	1
September	16	1	—	41	112	31	—	—
October	13	2	—	31	140	20	1	4
November	25	—	—	36	217	—	—	—
December	19	—	1	34	346	42	—	1
	234	14	1	437	1,898	385	1	8

Grand Total — 2,978 carcasses.

Out of all the carcasses examined, the following condemnations were made:—

Major portions:— 1 hog for dropsy.

Minor portions:— Sixty due to inflamation.
Seven due to Tuberculosis.
One due to abcessation.
One due to pyelonephritis.
Two due to fibrosis.
One due to bruising.

For three months of the year there were no condemnations at all.

ARTIFICIAL INSEMINATION.

No progress in this field during 1948, as most dairymen are now importing their additions and heifer raising has reached an all time low.

ANIMALS ADMITTED.

Only animals carrying adequate certificates of health from a proper authority in their country of origin are admitted. In the case of Steamships I, personally, meet all those carrying animals, while in the case of aeroplanes the Inspectors of the Department of Public Health collect the certificates if they are in order and if not the animals are detained until I can be contacted.

Again I must repeat my plea for a quarantine station for animals. Repeatedly animals or birds arrive here and their health certificates are behind in the mail and as a result I must make my home a temporary quarantine station until the certificates arrive. Also occasionally horses arrive with a touch of influenza and should be quarantined for a week or so to prevent any danger of it getting spread among local horses.

The following animals were admitted in 1948:—

Horses	—	34	(mainly race horses).
Dogs	—	106	
Hogs	—	101	
Cattle	—	65	

Birds:

Canaries	—	8	Toucans	—	5
Parrots	—	12	Sackes	—	3
Ducks	—	9	Mocking birds	—	3
Parakeets	—	4	Marudi	—	1
Pigeons	—	303	Powis	—	2
Cockatoos	—	4	Caduri	—	1
Cockateels	—	12	Budgerigars	—	17
Hill Mynahs	—	2			
Turkey Chicks	—	3 cartons.			
Baby Chicks	—	95 cartons plus 1,100.			

Monkeys	—	13	
Capybaras	—	2	
Kangaroo	—	1	
Galaks	—	2	
Wallabies	—	3	
Live frogs	—	3	boxes.
Cats	—	2	
Turtles	—	4	
Bees	—	4	boxes.
White rats	—	1	box.

DAIRY INSPECTION.

Members of the Livestock Committee, the Milk Inspector and the Government Veterinary Officer inspected all the dairy farms during the year to regrade them and to suggest further improvements. It would appear that this is about the only time during the year that this is done instead of once a month as should be done by the Milk Inspector to keep them up to scratch.

IMPROVEMENT OF LIVESTOCK.

The Government owned bulls are now all out on rent or loan and two were interchanged during the year. It will become necessary, later this year, to consider additional importation of bulls to replace some of those which are getting very heavy.

The importation of good class dairy cattle and Yorkshire hogs from the Dominion of Canada, should also aid markedly in the improvement of the local stock.

POLICE CASES.

On twelve occasions I was requested by the police to examine various animals and in some instances to give professional evidence in court.

CERTIFICATES ISSUED.

Thirteen certificates of health were issued to persons wishing to take animals abroad.

OTHER DISEASES.

Twice during the year there was an outbreak of Swine Erysepalous at the farm of A. J. Terceira in Southampton. Fortunately it was the skin or mild form and prompt treatment with anti-swine erysepalous serum prevented any loss and checked the spread. As far as is known it did not appear elsewhere.

On one occasion I was called in by Dr. Prescott to examine a flock of chickens which had a very high and rapid mortality rate. Apparently it was Fowl Cholera and after wiping out the flock, the disease died out. Treatment in such cases is useless.

There was quite a serious outbreak of contagious Bovine Ophthalmia at the farm of Joseph Oliviera of Southampton. Mixed Bacterin (Bovine) Formula 1 was used and restricted the outbreak, but several animals unfortunately lost the use of one eye.

An outbreak of Foot Rot occurred also in Oliviera's herd. Intravenous injections of Sodium Sulfaphridine were used with good results.

On several occasions I was called to the Government Aquarium to attend to Wallabys and Kangaroos that had received injuries from marauding dogs and which later became infected with Actinomyces, resulting in death. Mr. Mowbray got in touch with the Taronga Park Zoo, Sydney, Australia and they supplied the information that the condition was infectious rather than contagious and usually followed some injury to the head and was usually fatal. This was the exact picture of the trouble here.

The incidence of mastitis is reaching alarming proportions in the dairy herds of these Islands at this time. Much of this is due to the increase of high producing cows in these herds and the force feeding that is more or less universally practised by dairymen here.

With the incidence of T.B. reduced and the Bang's Vaccination proceeding according to schedule, I advise a co-operative plan between owner, private practitioner and the Department in an attempt to reduce the incidence of this disease, which has a much more marked crippling influence on milk production than any other disease.

STATION STOCK.

Livestock at the station now is reduced to pigs only and there has been no trouble in these during 1948.

OTHER ACTIVITIES.

On two occasions I was afforded the opportunity of the use of Z.B.M. to address the general public. The first address dealt with Brucella infection in cattle, its relationship to man and human disease and our methods of control. The second address dealt with Meat Inspection as carried out here and the wholesomeness of locally produced meats.

I was called on to advise the S. P. C. A. in regard to a set of kennels to be used as a public dog pound under the Control of the S. P. C. A. Inspector.

For the first time since I assumed the office of Government Veterinary Officer I was called to examine the horses at the Government House and sent a complete report covering them. Since then I have been requested to examine them at least once a month.

During November I was in the Dominion of Canada in an advisory capacity re cattle and also to brush up on the latest treatments for certain diseases. A special report covers this phase of my activities.

With the exception of being badly stung by bees, the years activities resulted in no injuries to my person, although the assistant supplied by the Department had his hands badly torn by wire-repaired cow chains.

Until Dr. Prescott arrived in these Islands the number of emergency calls that I was called upon to answer was very great; that has now subsided and it is only rarely that I am called on to aid a private case that needs immediate attention.

APPRECIATION.

As in previous years the great majority of livestock owners were most co-operative and appreciative.

The S. P. C. A. continued to graciously permit their Inspector to assist in the tuberculin testing of cattle, and he also aided in the Hog Inoculation programme.

Respectfully submitted,

EDWARD R. EARL.
Government Veterinary Officer.

APPENDIX "A".

SUMMARY OF RECEIPTS FOR YEAR 1948.

Vote 2	(a)	Packing House	£324	5	0	
	2 (b)	Marketing Centre	12,179	1	0	
	2 (c)	Canning Plant	NIL			
	2 (d)	Service to Citrus Growers	435	5	6	
	2 (e)	Other Receipts	3,830	4	2	
						£16,768 15 8

The following is a breakdown of the above:—

Vote 2	(a)	Sale of Bushel Crates	£324	5	0	
	2 (b)	Sale of Vegetables at Marketing Centre	12,179	1	0	
	2 (c)	NIL				
	2 (d)	Service to Citrus Growers	435	5	6	
	2 (e)	Hire of Equipment	642	7	0	
		Sale of Plants, etc.	722	8	2	
		Sale of Fertilizer	6	18	0	
		Sale of Citrus	1,213	16	6	
		Sale of Avocados	85	10	0	
		Sale of Livestock	243	0	0	
		Stock Service	42	18	0	
		Pruning Cedars	10	17	6	
		Miscellaneous Sales	69	8	3	
		Agricultural Exhibition	793	0	9	
						£16,768 15 8

APPENDIX "B".

EXPENDITURES FOR YEAR 1948.

Vote:	Service:	Amount of Vote:	Expenditure:	Balance Lapsing:
1	Fees to Members of Board	£100 0 0	£74 0 0	£26 0 0
2-8, 10, 12 & 15	Salaries	6,600 0 0	6,181 17 11	418 2 1
9, 16 & 19	Bonus	680 0 0	621 17 11	58 2 1
11	Travel allow. to G.V.O.	75 0 0	75 0 0	NIL
13	Extra Clerical Assistance	1,248 0 0	1,150 15 0	97 5 0
14	Bonus to E.C.A.	150 0 0	146 15 11	3 4 1

Vote:	Service:	Amount of Vote:	Expenditure:	Balance Lapsing:
17	Clerk, Marketing Centre	468 0 0	331 3 4	136 16 8
18	Bonus to Clerk Mar. Centre	50 0 0	NIL	50 0 0
20	General Grant	3,500 0 0	3,477 6 4	22 13 8
21	Control of Animal Disease, etc.	1,750 0 0	1,676 10 5	73 9 7
22	Control of Plant Diseases and Pests	150 0 0	138 13 10	11 6 2
23	Horticulture	2,200 0 0	2,155 15 11	44 4 1
24	Govt. House Gardens	2,100 0 0	1,874 5 4	225 14 8
25	Departmental Contingencies, Travel Exp. etc.	250 0 0	248 18 10	1 1 2
26	Packing House, Service and Contingencies	200 0 0	193 14 11	6 5 1
27	Canning Plant	4,000 0 0	172 10 5	3,827 9 7
28	Cold Storage Plant Operation	1,600 0 0	1,115 6 1	484 13 11
29	Purchase, Upkeep and Operation, etc.	3,650 0 0	3,482 1 0	167 19 0
30	Purchase and Storage of Agric. Supplies	500 0 0	447 19 0	52 1 0
31	Purchase and Storage of Potatoes and other Agric. Supplies for Resale	18,000 0 0	12,245 4 10	5,754 15 2
32	Agricultural Scholarships	880 0 0	107 7 5	772 12 7
33	Agricultural Exhibition	750 0 0	750 0 0	NIL
34	Biological Control of Insects of Importance in Bermuda	10,000 0 0	9,792 6 2	207 13 10
35	Reafforestation and Roadside Planting	2,000 0 0	760 18 11	1,239 1 1
36	Service to Citrus Growers	1,200 0 0	777 18 9	422 1 3
37	Publications	750 0 0	657 18 8	92 1 4
		£62,051 0 0	£48,656 6 11	£14,194 13 1

APPENDIX "C".

STATEMENT OF RECEIPTS AND PAYMENTS FOR AGRICULTURAL EXHIBITION 1948.

RECEIPTS.

Imprest from Colonial Treasurer	£	750	0 0
Gate Receipts (All Gates, Encl. etc.)		1,119	7 0
Special Prize Money from Donors		16	0 0
Rent from Stalls		112	0 0
Auction, Fruit and Vegetables		12	18 9
Prize money reimbursed to account		6	14 0
	£	2,016	19 9

PAYMENTS.

Labour	£	379	5 3
Lumber		65	3 4
Other Supplies		125	3 2
Printing, Advertising and Stationery		222	7 2
Prizes for Ring Events		96	3 8
Cash Prizes		327	3 0
Payment to Miss H. Nicholls		3	10 0
Loan of W. D. Stores		5	3 5
Unexpended Balance transferred to Treasury		793	0 9
	£	2,016	19 9

ACKNOWLEDGMENTS.

I wish to gratefully acknowledge the encouragement and assistance afforded me by members of the Board of Agriculture on assuming the duties of Director.

The assistance afforded the Department by the Commonwealth Bureau of Biological Control under the direction of Dr. W. R. Thompson has been invaluable.

To the many institutions and individuals who have contributed to the welfare of the activities of the Department I wish to record my grateful thanks.

Respectfully submitted,

W. R. EVANS.
Director of Agriculture.

April 1949.